E R A·M I N

NETWORK ON THE INDUSTRIAL HANDLING
OF RAW MATERIALS FOR EUROPEAN INDUSTRIES

ERA-MIN Joint Calls

The Projects' Abstracts

Table of Content

Project acronym	**CELMIN**		
Project title	**Utilisation of green chemicals in non/energy extractive industries: Preparation of modified nanofibrillar celluloses (NFC) for flotation, flocculation and dewatering, and water purification in mining industry**		
Sub-topics	Extraction, Mine closure and rehabilitation, Minerals processing		
Publishable abstract	Although the majority of dissolved solid substances in waters originates from ore, a small amount of pollutants comes from oil-based chemicals used in flotation as well as other metal concentration processes and dewatering, possibly creating toxicity problems when released in effluents. Thus, the purification of waters coming from both extraction and mineral processing during mining activities is needed. Mineclosure and rehabilitation issues have to be taken into account because acid drainages are also generated at abandoned mine sites. The CELMIN project aims to develop concepts for environmental- friendly effective green chemicals by the chemical modification of nanofibrillar celluloses (NFCs) to be functional in mining applications responsible for dissolved and suspended solids load. Four different uses are studied: 1. Use of hydrophobized NFCs as a collector in ore and mineral flotation. 2. Use of anionized, cationized and hydrophobized NFCs as a dewatering agent in concentrate and tailings. 3. Use of anionized and cationized NFCs as a flocculant in suspended solids removal from mining, process and seepage waters. 4. Use of anionized NFCs as adsorbent in removal of heavy metals and ammonium from waters. The results of the CELMIN project are expected to increase sustainability of primary non-energy resource supply by decreasing water pollution of mining industry, lower carbon footprint by using renewable raw materials instead of a fossil feedstock in chemical production and lessen the concern about environmental issues by using biodegradable chemicals in dressing of ores and water purification.		
Consortium partners	1. University of Oulu (Finland) - Coordinator 2. IST LISBON (Portugal) 3. NUCBM (Romania) 4. Sibelco Lda (Portugal) 5. Sojitz Beralt Tin & Wolfram S.A (Portugal)		
Project duration	30 months (2014-2016)		
Total Costs	€ 449.911	**Total Requested Funding**	€ 329.911

Project acronym	**GEOSULF**		
Project title	**Utilization of sulphide mine tailings in geopolymer materials**		
Sub-topics	Mine closure and rehabilitation, Minerals processing		
Publishable abstract	The GEOSULF project aims to sustainable utilization of sulphide mine tailings in geopolymer materials. Three Universities from Finland, Poland and Portugal will develop geopolymerization recipes, geopolymer aggregates and concrete products utilizing sulphide mine tailings provided by Finnish and Polish gold and copper mines. In geopolymerization, alumina and silica rich materials are activated with alkali solution. The formed geopolymer is a three-dimensional amorphous network that can immobilize hazardous components into its structure. The project aims at deep understanding on geopolymerization of mine tailings into a form in which harmful substances cannot dissolve. The project involves four RTD parts: Understanding of geopolymerization by model sulphide and heavy metal components; Development of geopolymer recipes and aggregates from mine tailings; Development of novel geopolymer based products like mine backfills and concrete bricks; Environmental assessment of products developed. The project results in new treatment technologies, mining practices and novel products. Development of new methods and products will provide new business opportunities for companies and more jobs in EU and promote exportation business possibilities from EU to other countries. To roll out research results across all EU member states will promote generation of new European researcher network in the area of mine tailings utilization.		
Consortium partners	1. University of Oulu (Finland) - Coordinator 2. University of Aveiro (Portugal) 3. AGH University of Science and Technology (Poland)		
Project duration	40 months (2014-2017)		
Total Costs	€ 781.052	**Total Requested Funding**	€ 601.025

Project acronym	**MAXI**		
Project title	**Mineral Analysis using X-ray Imaging**		
Sub-topics	Minerals processing		
Publishable abstract	The main objective of the research is to improve material analysis efficiency, both in terms of material recognition accuracy and speed of detection. XRF spectroscopy is widely used in production plants and exploration of mining companies, both as handheld instruments and in conveyor belt analysis subsystems. However, current industrial XRF systems have poor spatial resolution: they typically are unable to localize particles with dimensions below 100 mm. The goal of the project is to improve the selectivity at least with one order of magnitude, down to about 10mm spatial resolution. Another shortage of current industrial XRF systems is the fact that they only analyse the surface of the sample, ignoring most of the volume. This gives an erroneous estimate of the element concentration, especially for elements with uneven distribution, such as precious metals. The goal here is to read XRF-signals from the whole sample volume by using high energy X-ray generators and detector arrays.		
Consortium partners	1. Teknologian tutkimuskeskus VTT (Finland) - Coordinator 2. Orexplore AB (Sweden) 3. Advacam Oy (Finland) 4. Geological Institute of Romania (Romania)		
Project duration	3 years (2014-2017)		
Total Costs	€ 1.050.000	**Total Requested Funding**	€ 482.334

Project acronym	**SUSMIN**		
Project title	**Tools for sustainable gold mining in EU**		
Sub-topics	Minerals processing		
Publishable abstract	Gold mining is a chance for Europe to increase economic development, but its challenge is eco-efficiency due to low grade of gold in the ore, its extraction methods (e.g. cyanide) and association often with arsenopyrite. Due to its high mobility and toxicity, arsenic is problematic in mine wastes and waters, but it also complicates the recovery of gold. Social licence for gold mining is often more challenging by respect to other mineral resources. Thus, economically viable gold mining is also dependent on environmental and social sustainability. The objective of the project is to support environmentally, socially and economically sustainable gold production within EU to decrease import dependency. The project identifies, tests and improves technological solutions for gold exploration, mineral processing, water treatment, waste management and environmental impact assessment. In addition, project aims to develop tools for enhancing corporate social responsibility, social acceptance and designing postmining development. Research and development measures will be carried out cooperatively between partners and industrial companies in case studies at participating countries. The project provides new sustainable technologies for exploration, selective gold recovery with decreased environmental impacts, alternative reagents for cyanide, advanced adsorbents for water treatment and methods for sustainable waste management such as paste technology. With the environmental risk assessment and better knowledge of geochemistry and long-term transformation of the contaminants in wastes and mine waters, the mining companies are able to predict and prevent the impacts to the surrounding environment. Results will be combined to reports and recommendations for mine industry and will be useful for the industrial partners and have national and transnational impact.		
Consortium partners	1. Geological Survey of Finland, GTK (Finland) - Coordinator 2. Luleå University of Technology (Sweden) 3. Geological Institute of Romania (Romania) 4. Wrocław University of Technology (Poland) 5. Babes-Bolyai University (Romania) 6. Trinity College Dublin, School of Chemistry (Ireland) 7. University of Porto (Portugal)		
Project duration	36 months (2014-2016)		
Total Costs	€ 1.562.454	**Total Requested Funding**	€ 1.227.205

Project acronym	**AMDREY**		
Project title	**Extraction of Rare Earth Elements from Acid Mine Drainage**		
Sub-topics	Recycling of mining and smelting residues (incl. historical dumps and tailings)		
Publishable abstract	Rare Earth Elements and Yttrium (REY) are Critical Raw Materials (CRM) which are essential for modern technologies. They are conventionally mined from igneous rocks, and they are now a priority exploration target worldwide. The ultimate objective of the proposal is the extraction of REY from the treatment of Acid Mine Water (AMD). This is an unwanted pollution that is expected to flow out from coal and sulphide mines for hundreds of years. AMD hosts REY concentrations much higher than those in continental waters and oceans. AMD treatment systems produce low crystalinity iron and aluminium hydroxides. Preliminary surveys have shown that these solids retain practically all REY dissolved in AMD. Therefore, the outputs may provide a new and almost inexhaustible natural source of REY that is sustainable and beneficial to the environment. The objective of the proposal is to test the feasibility and the optimum conditions to recover REY from AMD. Two methods of AMD neutralisation and precipitation of REY are proposed: the addition of controlled doses of alkaline reactives for high flow rate discharges; and the passive infiltration through a limestone filter. Both procedures aim to obtain a sequence of precipitates where REY can be obtained selectively. The systems will be tested at laboratory and field scale in the Spain and in South Africa. These hydrated precipitates are then dried and concentrated into oxides ready to be transported for extraction. Finally, REY concentrate with high purity will be obtained by a multi- step extraction process consisting of leaching and chemical separation. From these solutions, advanced REY materials could be obtained (coordination polymers, self-assembled lanthanide- organic frameworks) showing interesting application (catalyst, photonic or magnetic properties). Also a novel method based on a recently developed recyclable porous material, called CH Collector, will be tested to directly collect REY from AMD without any precipitation step.		
Consortium partners	1. Agencia Estatal Consejo Superior de Investigaciones Científicas (Spain) - Coordinator 2. Institut de Chimie Séparative de Marcoule (France) 3. University of the Free State (South Africa) 4. Universidad de Huelva (Spain) 5. Oy Chemec Ab (Finland)		
Project duration	24 months (2016 -2018)		
Total Costs	€ 972.500	**Total Requested Funding**	€ 830.140

Project acronym	**BOFLUX**		
Project title	**Characterisation of the impact, boron addition has on the physical and smelting properties of chromite slag**		
Sub-topics	Metallurgy		
Publishable abstract	The slag liquidus temperature in most pyrometallurgical processes is controlled by the addition of fluxes such as silica, lime and dolomite. High-melting point materials, like chromite ores (the only commercial source of chromium metal), in particular utilises the flux principle. Boron containing fluxes are widely used for glass production since they lower the melting temperature of silica by a significant extent. The purpose of this study is to evaluate the potential use of boron containing minerals in chromite smelting process to achieve improved energy and operating efficiencies.		
Consortium partners	1. Mintek (South Africa) - Coordinator 2. Ab Etiproducts Oy (Finland) 3. Siyanda Chrome Smelting Company Pty Ltd (South Africa)		
Project duration	24 months (2015-2017)		
Total Costs	€ 269.500	**Total Requested Funding**	€ 221.925

Project acronym	**ENVIREE**		
Project title	**ENVIronmentally friendly and efficient methods for extraction of Rare Earth Elements from secondary sources**		
Sub-topics	Extraction, Minerals processing, Mine closure and rehabilitation, Recycling of mining and smelting residues (incl. historical dumps and tailings)		
Publishable abstract	The ENVIREE project develops processes making it possible to extract REE from different types of secondary sources currently handled as waste. The developed leaching processes will be more environmentally friendly than the current ones, thus making REE extraction possible in Europe again. Various waste materials (mostly tailings from other metals mining and processing) will be investigated with respect to their REE potential. Optimized leaching processes will be developed. Plant uptake for both recovery of sites and enrichment of REE at the same time (biosorption and bio-precipitation) will be studied. Life cycle analysis will be performed to guide the selection of optimal processes and land reclamation. This will be combined with remediation studies and suggestions for the different selected sites. We will also put a significant effort in education and training of young scientists and students in the relevant scientific fields.		
Consortium partners	1. Chalmers University of Technology (Sweden) - Coordinator 2. AGH/AGH UST University of Science and Technology/ Akademia Górniczo-Hutnicza im. Stanislawa Staszica w Krakowie (Poland) 3. Alexandru Ioan Cuza University (Romania) 4. Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (Portugal) 5. Karlsruher Institut für Technologie (KIT) (Germany) 6. Primus.inter.pares AS (Norway) 7. Commissariat A L Energie Atomique et Aux Energies Alternatives (France) 8. EDM - Empresa de Desenvolvimento Mineiro, S.A. (Portugal) 9. Council for Geoscience (South Africa) 10. Savona Project SP. Z O.O. (Poland) 11. Bureau de Recherches Géologiques et Minières (France)		
Project duration	40 months (2015-2018)		
Total Costs	€ 2.481.175	**Total Requested Funding**	€ 1.822.371

Project acronym	**EXTRAVAN**		
Project title	**Innovative extraction and management of vanadium from high vanadium iron concentrate and steel slags**		
Sub-topics	Extraction, Minerals processing, Metallurgy, Recycling of mining and smelting residues (incl. historical dumps and tailings), Metallurgical extraction		
Publishable abstract	Vanadium is an economically important metal for EU whose industry consumes about 13 % of the global vanadium production. Vanadium is mainly used for production of high strength and special steels, and advanced alloys for aerospace application. The vanadium production in EU is highly dependent on import of the raw materials. At the same time there are large amount of unexploited vanadium sources in EU member states. There are several titaniferrous ore deposits with around 1% V and large amount of steelmaking slag (BOF-slag) with up to 3 % V. This consortium (partners + subcontractors) consisting of three world leading research institutes (Swerea MEFOS/BRGM/GTK) in the fields of mineral processing, process metallurgy and environmental technology, a world recognised research group at KTH and a mining and metallurgical company Mustavaaran Kaivos Oy (owner of a Vrich titaniferrous ore deposit in Finland). This project seeks to develop breakthrough technologies which will enable economic and environmental friendly exploitation of these unused vanadium sources in Europe.		
Consortium partners	1. Swerea MEFOS (Sweden) - Coordinator 2. Mustavaaran Kaivos Oy – FERROVAN (Finland) 3. Bureau de Recherches Géologiques et Minières (France)		
Project duration	26 months (2014 -2017)		
Total Costs	€ 1.203.234	**Total Requested Funding**	€ 829.912

Project acronym	**NewOres**		
Project title	**Development of New models for the genesis of Rare Metal (W, Nb, Ta, Li) Ore deposits from the European Variscan Belt and valorization of low grade and fine grained ore and mine tailings**		
Sub-topics	Exploration, Extraction, Minerals processing, Metallurgy		
Publishable abstract	NewOres is a project devoted to the: i) development of new models of ore deposition relevant for the W-Sn (Nb-Ta-Li) mineralisations, and intend to propose of new exploration guides for this type of mineralization, by building a fully comprehensive model for the behaviour of metals during crustal magmatic events, and ii) by understanding the behaviour of these metals at the hydrothermal stage, thanks in particular to by refinement of the in-situ analysis of trace elements especially Nb and Ta in oxides (SnO_2, $FeWO_4$) and in fluid trapped as fluid inclusions, and by building a new thermodynamic database for Nb and Ta species. iii) Finally, a major goal is the development of new flow sheets for the processing of low grade and fine-grained ores and tailings, in particular from a major W mine (Panasqueira) from already mined deposits thanks to new intensive flotation devices, the combination with centrifugal gravity separation, and search to develop a new energy saving mineral processing.		
Consortium partners	1. Université de Lorraine (France) - Coordinator 2. Sojitz Beralt Tin & Wolfram S.A. (Portugal) 3. Fundação Faculdade de Ciências, Universidade de Lisboa (Portugal) 4. Faculdade de Ciencias da Universidade do Porto -FCUP (Portugal) 5. Université d'Orléans (France) 6. Laboratório Nacional de Energia e Geologia-LNEG Lisboa (Portugal)		
Project duration	48 months (2015-2018)		
Total Costs	€ 1.818.244	**Total Requested Funding**	€ 451.343

Project acronym	**RAREASH**		
Project title	**Assessment of Possible Recycling Directions of Heavy & Rare Metals Discovered from Combustion Waste Products**		
Sub-topics	Recycling of mining and smelting residues (incl. historical dumps and tailings), Substitution of critical materials for green energy technologies		
Publishable abstract	Heavy and Rare Metals-HRM consisting of Lanthanides are important strategic materials for ensuring the security and defensive capacity of states, providing economic development and forming a basis for advanced materials and technologies, particularly electronics. Majority are mined and extracted from primary ore in highly energy intensive processes. Concentrations of these elements are localized in limited areas, and countries and companies, whose manufacturing or technology base depends on imported metals are beginning to look for alternative sources. The project aims to demonstrate by a detailed fundamental and applied investigation the technically feasible alternative for critical metals recovery by recycling combustion waste products (CWP) - fresh and reuse landfilled fly ash and bottom ash - as a source soft (pulverized) rock. The HRM concentrations in non-energy CWP are available in great amounts due to its original concentration in coal forming basins and to large volumes of coal burnt generating huge amounts of mineral phases, organic matter free that host HRM, among other elements. The proposed approach with a very limited experience in EU and even worldwide will create the possibility for a fast and low-cost access to critical materials and of EU saving natural mineral resources by use of unconventional secondary resources. RareAsh is focused to comply with EU priorities by proposed actions which are innovative (by using recovery methods based on acids and not on cyanides for the advanced recycling of ashes) and have a demonstrative character at laboratory scale.		
Consortium partners	1. Research Centre for Environmental Protection and Eco-Friendly Technologies (CPMTE) from University Politehnica Bucharest (UPB) (Romania) - Coordinator 2. Constantin Brancusi University of Targu Jiu (Romania) 3. Faculdade de Ciências da Universidade do Porto (Portugal) 4. Główny Instytut Górnictwa (Central Mining Institute) (Poland) 5. LIPOR (Portugal) 6. Complexul Energetic Oltenia S.A. (Romania) 7. Przedsiebiorstwo Produkcyjno Handlowe "ADW" Sp. z o.o. (Poland)		
Project duration	44 months (2015-2018)		
Total Costs	€ 859.803	**Total Requested Funding**	€ 805.327

Project acronym	**StartGeoDelineation**		
Project title	**State-of-the-art geophysical and geological methods for delineation of mineral deposits and their associated structures**		
Sub-topics	Exploration, Extraction		
Publishable abstract	Through this project Uppsala University, Nordic Iron Ore, and Yara in collaboration with researchers from the Geological Survey of Finland will expand their research profiles and expertise regarding exploration (mainly) for raw materials and mine planning (partly) in their respective countries. Along with the associated knowledge transfer, this is a first step towards preparing the partners for further collaborations and allowing technological and methodological developments that can be exported or demonstrated to other countries in Europe and even beyond. The project focuses on three important aspects of exploration namely geophysical, geological and petrophysical studies along with the development of tools and methods for a better delineation and characterisation of mineral deposits and their host rock structures through basic mapping, petro-mineralogical studies, deep imaging and targeting, 3D/4D geophysical and geological modelling at two sites in Sweden and Finland where active exploration or mining is currently ongoing.		
Consortium partners	1. Uppsala University (Sweden) - Coordinator 2. Nordic Iron Ore (Sweden) 3. Yara (Finland)		
Project duration	43 months (2014-2018)		
Total Costs	€ 963.522	**Total Requested Funding**	€ 471.707

Project acronym	**HiTEM**		
Project title	**Highly sensitive receiver for measuring transient electromagnetic responses in Exploration for deep buried mineral occurrences**		
Sub-topics	Exploration		
Publishable abstract	The proposed collaborative research project 'HITEM' addresses the first topic area of the third ERA-MIN joint call (2015) towards the non-energy raw material value chain: the development of a new tool for the electromagnetic (EM) exploration of primary resources. Amongst the variety of EM methods in geophysics, the time-domain method TEM is used to generate a 3D illustration of the sub-surface electrical conductance especially for geological structures which provide a continuous conducting layer. The task in this project is to develop a new extremely high sensitive receiver based on high transition temperature superconducting quantum interference devices (HTS SQUID). New sensor fabrication and packaging technologies, innovative readout electronics and control systems have to be developed by the partners for the demonstrator in order to assess the performance in different field tests. Within the tests in Finland, South Africa and Germany a database for the development of a suitable remote reference method for TEM will be gathered. All these tasks will provide ultimate sensitivity for low frequency signals and thus enable detection of conducting resources well below 500 m. Based on the data recorded in the tests at sites with known deep deposits, which especially contain an economic grade of platinum-groupelements material often found in sulfidic deposits, new or adapted inversion and interpretation algorithms for SQUID based receiver data have to be developed and their results compared with prior knowledge of the according structures. Thus, the utmost important goal of this industrial driven proposal with partners from Finland, South Africa and Germany is to contribute to the exploration of natural resources of critical raw materials with the focus to provide European companies in the field of exploration with internationally competitive geophysical instruments and methods		
Consortium partners	1. Supracon AG (Germany) - Coordinator 2. BroadBand Geophysical (Pty) Ltd (South Africa) 3. Leibniz Institute of Photonic Technology (Germany) 4. Drillcon SMOY (Finland)		
Project duration	3 years (2016 – 2018)		
Total Costs	€ 1.435.000	**Total Requested Funding**	€ 699.000

Project acronym	**COGITO-MIN**		
Project title	**COst-effective Geophysical Imaging Techniques for supporting Ongoing MINeral exploration in Europe**		
Sub-topics	Exploration, Extraction		
Publishable abstract	University of Helsinki, Geological Survey of Finland, Institute of Geophysics, Polish Academy of Sciences, Boliden, Vibrometric and Geopartner, research institutions and industry partners from Finland and Poland, are collaborating on an applied research project on cost-effective, novel geophysical mineral exploration techniques, with particular emphasis on seismic imaging. One of the main challenges of mineral exploration, as also stated on the ERA-MIN research agenda, is finding and characterizing deeper-seated resources to satisfy the growing worldwide demand for raw materials. Seismic imaging is particularly attractive for deep mineral exploration because of superior depth penetration and resolution when compared to other geophysical imaging techniques. This research initiative joins the forces of research institutions and industry, and aims at comprehensive methodological advances in the use of seismic imaging for mineral exploration in Europe and beyond. We acknowledge also the need for well-integrated geophysical and geological approaches, and aim at developing joint analyses of different data. The overall goal is to develop integrated geophysical-geological approaches for building realistic 3D geological models, delineation of known deposits and identifying new reliable drilling targets, with further impact on reducing the cost of drilling, and as such fitting the objectives of the ERA-MIN network. All the partners in our proposal have their unique expertise in different aspects of the project, and the core of the project is knowledge transfer between the partners. We consider this project a first step in a future of collaborations. Specific attention will be paid to communicating acquired knowledge also to a broader audience		
Consortium partners	1. University of Helsinki (Finland) - Coordinator 2. Institute of Geophysics, Polish Academy of Sciences (Poland) 3. Geological Survey of Finland (Finland) 4. Boliden Kylylahti Oy (Finland) 5. Vibrometric Oy (Finland) 6. Geopartner Sp. z.o.o. (Poland)		
Project duration	3 years (2016-2018)		
Total Costs	€ 2.017.200	**Total Requested Funding**	€ 1.227.400

Project acronym	**REMinE**		
Project title	**Improve Resource Efficiency and Minimize Environmental Footprint**		
Sub-topics	Extraction, Mine closure and rehabilitation, Minerals processing		
Publishable abstract	The global demand for metals and minerals is growing rapidly; Europe has a huge trade deficit for metallic minerals, and therefore needs to extract more of its own resources to reduce this dependence. The occurrence of valuable minerals and metals in historical mine waste can in many cases constitute a risk for the environment, but can also be a resource of critical materials. The project vision is to "clean up" historical mine sites by extracting critical metals and separating minerals, thereby minimizing the amount of harmful mine waste. The project is divided into five work packages; project administration by Luleå University of Technology (WP1), detailed characterization and risk assessment of the mine wastes (WP2), identification of new processing methods (WP3), characterisation and risk assessment of the remaining residues (WP4), outlining of business opportunities and a conceptual model for sustainable mining (WP5). The project has study sites from Portugal, Romania and Sweden. Owner of the sites are associated to the project and will contribute with their expertise of the sites, provide access to areas, attend in project meetings and continuously take part of the results during the project. The result is expected to lead to finding of new resources, new recycling technologies related to environmental risks, business opportunity and education of undergraduate and graduate students.		
Consortium partners	1. Luleå University of Technology (Sweden) - Coordinator 2. National Institute for Metals and Radioactive Resources (INCDMRR) (Romania) 3. Porto University (Portugal)		
Project duration	3 years (2016-2018)		
Total Costs	€ 1.021.207	**Total Requested Funding**	€ 871.056

Project acronym	**BIOCriticalMetals**		
Project title	**Recognition of microbial functional communities and assessment of the mineralizing potential (bioleaching) for high-tech critical metals**		
Sub-topics	Extraction, Mine closure and rehabilitation, Recycling of mining and smelting residues (incl. historical dumps and tailings)		
Publishable abstract	This project is conceived as a need-driven-research, focused on the concept that waste can become a valuable resource, supplying metals that are extracted today by other processes, promoting recycling, minimizing harmful waste and hazard and dissipation. The selection of the target minerals/ metals in the project addresses the need for continuous supply of these in Europe for technology, anticipating a future cost effectiveness potential of the practical application of the expected research results. Innovative methods and processes for extracting even faint traces of these elements are the focus of the project. New characterized microorganisms with potential to be applied in biosolubilization, biomineralization and bioaccumulation will be obtained. The consortium will assess the microbial biodiversity in tailings where potentially critical high-tech metals may exist (In, Ga, Te and W) but also relevant pollutants (As, Sb), located in different geological and climatic settings. Isolates will be tested in macrocosm conditions at the last part of the project. The ultimate focus will be to apply microorganisms in the extraction process through bioleaching and to recover the minerals from lixiviates by biomineralization and bioaccumulation. A comparative environmental risk assessment will be performed to residues produced by bioleaching with and without nanoparticles.		
Consortium partners	1. University of Coimbra (Portugal) - Coordinator 2. University of Porto - Engineering Faculty (Portugal) 3. National Research and Development Institute for Nonferrous and Rare Metals (Romania) 4. National Institute of Research and Development for Biological Sciences (Romania) 5. Universidad Nacional de San Luis (Argentina) 6. Empresa de Desenvolvimento Mineiro (Portugal) 7. Sojitz Beralt Tin and Wolfram S.A. (Portugal) 8. Geoplano, S.A. (Portugal) 9. G.T INGENIERIA S.A. (Portugal) 10. Direction de Mineria de la Provincia de San Luis (Argentina) 11. Comision Nacional de Energia Atomica (Argentina)		
Project duration	3 years (2016-2018)		
Total Costs	€ 573.267	**Total Requested Funding**	€ 549.694

Project acronym	**BATRE-ARES**		
Project title	**Battery Recycling – Achieving Rare Earth Separation**		
Sub-topic	Recycling, batteries, ionic liquids, liquid-liquid extraction		
Publishable abstract	BatRE ARES deals with the recovery of rare earth elements (REE) from NiMH batteries recycling. NiMH batteries are based on electrodes containing nickel and significant amounts of critical metals such as cobalt and REE including yttrium (Y) and lanthanides (La, Ce, Nd, Pr). REE are among the 14 elements defined as critical by the EU. REE are not produced within the European Union but used NiMH batteries are present in important amounts within the EU and could actually become an important source of REE. In this project two French laboratories (LEPMI and GSCOP), one French recycling company (Récupyl) and one Portuguese laboratory (CICECO-UA) will work together to contribute to the elaboration of an innovative, original and low impact recycling process. The latter will start with the treatment of real battery residues (brought by the industrial stakeholder) and will end up by the recovery of pure REE. The main originality of this project lies in the fact that hydrometallurgical processes will be based on alternative solvents, namely ionic liquids, yielding a potential process in line with the principles of sustainable chemistry that will go beyond the state of the art of REE recycling. In order to maximize the chances of success of this project, a total of three potential recycling routes are envisaged depending on the phase in which processes will be carried out. The investigation will focus on leaching of crushed battery residues using either acidic solutions, pure ionic liquids or ionic liquid –based aqueous biphasic systems (ABS). Liquid-liquid extraction steps for the recovery of metal ions from aqueous leachates will be studied using ionic liquids or ABS. Finally, recovery of metals from the extraction phases will be studied by electrodeposition and precipitation. Because a recycling process cannot be proposed without a thorough study on its environmental impact, the latter will be carried out within the project.		
Consortium partners	1. LEPMI (France) - Coordinator 2. CICECO (Portugal) 3. GSCOP (France) 4. Recupyl (France)		
Project duration	3 years (2016-2019)		
Total Costs	€ 608.151	**Total Requested Funding**	€ 428.228

Project acronym	**CHARPHITE**		
Project title	**Coal char as a substituting material of natural graphite in green energy technologies**		
Sub-topics	Substitution of critical materials for green energy technologies		
Publishable abstract	Graphite is a mineral of strategic importance for European Union. However, every year millions of tons of unburned semi-coked carbon (char) produced by the coal power plants are landfilled or added to concrete with negative impacts, while char could be used as a substituting material of natural graphite. Therefore, CHARPHITE project aims at: (i) concentrate and purify char from coal ash using classic separation methods and ultrasonication; (ii) producing composite metallic oxides with CHAR, and carry a comprehensive electrochemical characterization of the novel carbon materials to be tested as electrode materials (electrocatalysts) for relevant energy-related reactions; (iii) performing industrial research to use these carbon materials as an additional supply source for the production of graphite electrodes and rods		
Consortium partners	1. University of Porto (Portugal) - Coordinator 2. University Politehnica Bucharest (Romania) 3. REQUIMTE (Portugal) 4. CONICET & University of Buenos Aires (Argentina) 5. University "Constantin Brancusi" of Targu Jiu (Romania) 6. CENTRAL MINING INSTITUTE (Poland) 7. CARBO-GRAF SP. Z O.O. (Poland) 8. University of Johannesburg (South Africa) 9. Pegop – Energia Eléctrica, SA (Portugal)		
Project duration	3 years (2016-2019)		
Total Costs	€ 903.838	**Total Requested Funding**	€ 770.451